

## **Acknowledgements**

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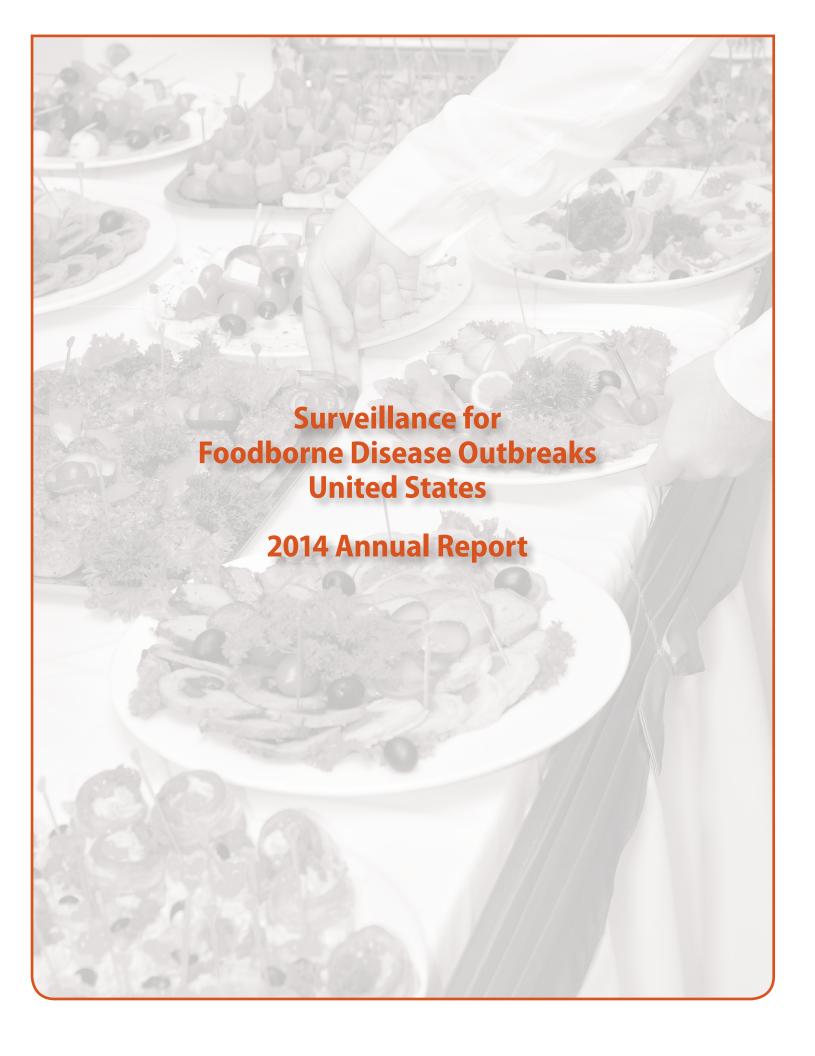
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## **Contents**

Main Findings	1
Background	1
Findings	2
Limitations	3
References	4
<b>Figure:</b> Rate of reported foodborne disease outbreaks per 1 million population and number of outbreaks, by state and etiology	4
<b>Table 1:</b> Foodborne disease outbreaks, outbreak-associated illnesses, and hospitalizations, by etiology (confirmed or suspected)	5
<b>Table 2a:</b> Foodborne disease outbreaks and outbreak-associated illnesses, by food category	6
<b>Table 2b:</b> Most common pathogen-food category pairs resulting in outbreaks, outbreak-associated illnesses, hospitalizations, and deaths.	7
<b>Table 3a:</b> Reported foodborne disease outbreaks and outbreak-associated illnesses, by location of food preparation	8
Table 3b: Foodborne disease outbreaks and outbreak-associated illnesses,         by confirmed etiology and location of food preparation	9
Table 3c: Foodborne disease outbreaks and outbreak-associated illnesses,         by suspected etiology and location of food preparation	10
Table 4: Multistate foodborne disease outbreaks	11
Appendix: Foodborne disease outbreaks by etiology and contributing factors	12

## **Main Findings**

- In 2014, 864 foodborne disease outbreaks were reported, resulting in 13,246 illnesses, 712 hospitalizations, 21 deaths, and 21 food recalls.
- Ground beef was the contaminated food or ingredient in five of the 25 multistate outbreaks. Four were caused by Shiga toxinproducing *E. coli* and 1 by *Salmonella*.
- Fish (43 outbreaks), chicken (23), and dairy (19, of which 15 were due to unpasteurized products) were the most common single food categories implicated. The most outbreak-associated illnesses were from seeded vegetables (e.g. cucumbers or tomatoes, 428 illnesses), chicken (354), and dairy (267).
- As reported in previous years, restaurants (485 outbreaks, 65% of outbreaks reporting a single location of preparation), specifically restaurants with sit-down dining (394, 53%), were the most commonly reported locations of food preparation.

## **Background**

Foodborne diseases due to known pathogens are estimated to cause about 9.4 million illnesses each year in the United States. Although relatively few of these illnesses occur in the setting of a recognized outbreak, data collected during outbreak investigations provide insights into the pathogens and foods that cause illness. Public health officials, regulatory agencies, and the food industry can use these data to create control strategies along the farm-to-table continuum that target specific pathogens and foods.

An outbreak of foodborne disease is defined as the occurrence of two or more cases of a similar illness resulting from ingestion of a common food. Foodborne disease outbreaks are a nationally notifiable condition (<a href="http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/CSTENotifiableConditionListA.pdf">http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/CSTENotifiableConditionListA.pdf</a>). CDC conducts surveillance of foodborne disease outbreaks in the United States through the Foodborne Disease Outbreak Surveillance System. Public health agencies

in all 50 states, the District of Columbia, and U.S. territories voluntarily submit reports of outbreaks investigated by their agencies using a Web-based reporting platform, the National Outbreak Reporting System (NORS) (<a href="http://www.cdc.gov/nors/">http://www.cdc.gov/nors/</a>). NORS also collects reports of enteric disease outbreaks caused by other transmission modes, including water, animal contact, person-to-person contact, environmental contamination, and unknown modes of transmission.

Agencies use a standard form (http://www. cdc.gov/nors/pdf/NORS CDC 5213.pdf) to report foodborne disease outbreaks. Data requested for each outbreak include the reporting state; date of first illness onset; number of illnesses, hospitalizations, and deaths; etiology; implicated food and ingredients; locations of food preparation; and factors contributing to food contamination (see appendix). The reporting form also requests the reason(s) a particular food is suspected as the source; five choices are provided. (http://www.cdc. gov/nors/pdf/NORS Guidance 5213-508c.pdf). Foods reported in multistate outbreaks are further classified as confirmed or suspected sources. Reports of outbreaks on cruise ships that dock in both U.S. and international ports and those in which the food was eaten outside the United States, even if the illness occurred in the United States, are excluded from the Foodborne Disease Outbreak Surveillance System.

This report includes foodborne disease outbreaks reported by February 17, 2016, in which the first illness occurred in 2014. Etiologic agents were reported as confirmed if predefined criteria were met;<sup>2</sup> otherwise, they were reported as suspected. For outbreaks caused by a single confirmed or suspected etiology, etiologies were grouped as bacterial, chemical and toxin, parasitic, or viral. Multistate outbreaks were defined as outbreaks in which exposure to the implicated food occurred in more than one state or territory. Population-based outbreak reporting rates were calculated for each state using U.S. Census estimates of the 2014 state populations (<a href="http://www.census.gov/popest">http://www.census.gov/popest</a>). Multistate outbreaks were included in

state population-based outbreak reporting rates by assigning one outbreak to each state that reported a case in the outbreak. Implicated foods were classified into 1 of 24 single-food categories if a single contaminated ingredient was identified or if all ingredients belonged to that category.<sup>3</sup> Outbreaks attributed to foods that could not be assigned to one of these categories, or for which the report contained insufficient information for category assignment, were not attributed to any category.

## **Findings**

#### **States and Rates**

During 2014, 864 foodborne disease outbreaks were reported (Table 1), resulting in 13,246 illnesses, 712 hospitalizations, and 21 deaths. Outbreaks were reported by public health officials from 49 states and Puerto Rico (Figure). The median rate was 3.6 outbreaks per 1 million population; rates ranged from 0.7 outbreaks per 1 million population in Mississippi to 15.0 outbreaks per 1 million population in Alaska. No outbreaks were reported in South Dakota.

#### **Etiologic Agents**

A single etiologic agent was confirmed in 462 (53%) outbreaks (Table 1) which resulted in 8,810 (67%) illnesses. Bacteria caused the most outbreaks (247 outbreaks, 53%), followed by viruses (161, 35%), chemicals (46, 10%), and parasites (7, 2%). Norovirus was the most common cause of confirmed, singleetiology outbreaks, accounting for 157 (34%) outbreaks and 3,835 (43%) illnesses. Salmonella was next, accounting for 140 (30%) outbreaks and 2,395 (27%) illnesses. Among the 131 confirmed Salmonella outbreaks with a serotype reported, Enteritidis was the most common (40 outbreaks, 31%), followed by Typhimurium (15, 11%), I 4,[5],12:i:-(6, 5%), Javiana (6, 5%), and Newport (6, 5%). Shiga toxin-producing Escherichia coli (STEC) caused 23 confirmed, single-etiology outbreaks, of which 12 (52%) were caused by serogroup O157, 3 (13%) by O111, 3 (13%) by O26, 2 (9%) by O121, 1 (4%) by O103, 1 (4%) by O145, and 1 (4%) by O186.

## Illnesses, Hospitalizations, and Deaths

Of the 8,810 outbreak-associated illnesses caused by a single confirmed etiologic agent, 665 (8%) resulted in hospitalization (Table 1). Among confirmed, single-etiology outbreaks, *Salmonella* caused the most outbreak-associated hospitalizations (395 hospitalizations, 59%), followed by STEC (62, 9%) and *Listeria monocytogenes* (51, 8%). Outbreaks caused by *Listeria monocytogenes* resulted in the highest proportion of ill persons hospitalized (93%). Among the 21 deaths reported, 17 (81%) were attributed to bacterial etiologies (*Listeria monocytogenes* [13], STEC O157 [1], *Campylobacter* [1], *Clostridium botullinum* [1], and *Salmonella* [1]). Four deaths were attributed to norovirus.

### **Food Categories Implicated**

A food was reported for 369 (43%) outbreaks. In 205 (56%) of these outbreaks, the food could be classified into 1 of the 24 categories (Table 2a); the categories most commonly implicated were fish (43 outbreaks, 21%), chicken (23, 11%), and dairy (19, 9%). Pasteurization information was reported for 18 of the dairy outbreaks and 15 (83%) involved unpasteurized products. The most outbreak-associated illnesses were from seeded vegetables (e. g. cucumbers or tomatoes; 428 illnesses, 16%), chicken (354, 13%), and dairy (267, 10%).

# **Etiologic Agents and Food Category Pairs**

The pathogen-food category pairs responsible for most outbreaks with a single confirmed etiologic agent were ciguatoxin in fish (19), scombroid toxin (histamine) in fish (16 outbreaks), and *Salmonella* in chicken (11) (Table 2b). The pathogen-food category pairs responsible for the most illnesses in outbreaks with a single confirmed etiologic agent were *Salmonella* in seeded vegetables (357 illnesses), *Salmonella* in chicken (227), and *Staphylococcus aureus* enterotoxin in turkey (184). The pathogen-food category pairs responsible for the most hospitalizations in outbreaks with a single confirmed etiologic agent were *Salmonella* 

in seeded vegetables (68 hospitalizations), *Listeria monocytogenes* in fruits (36), and *Salmonella* in chicken (23). Deaths were reported for the following pathogen-food category pairs: *Listeria monocytogenes* in fruits (8 deaths), *Listeria monocytogenes* in sprouts (2), Norovirus in chicken (2); *Campylobacter* in dairy, *Clostridium botulinum* toxin in fish, *Listeria monocytogenes* in dairy, and STEC in beef (1 each).

### **Location of Food Preparation**

Among the 742 outbreaks and 10,895 illnesses with a reported single location where food was prepared, 485 outbreaks (65%) and 4,780 associated illnesses (44%) were attributed to foods prepared in a restaurant (Table 3a). Among these outbreaks, sit-down dining-style was the type of restaurant most commonly reported as the location where food was prepared (394 outbreaks, 53%).

#### **Recalls**

Twenty-one outbreaks resulted in product recalls. The foods recalled were raw oysters (4 outbreaks); tuna (3); ground beef (2); almond and peanut butter, apple, chia seed powder, chicken, Latin-style soft cheese, milkshakes, mung bean sprouts, romaine lettuce, pasteurized milk, peaches, pesto, and sprouts (1 each).

#### **Multistate Outbreaks**

Twenty-five multistate outbreaks (3% of all outbreaks) were reported (Table 4), resulting in 778 illnesses (6% of illnesses), 194 (28% of hospitalizations), and 11 deaths (52% of deaths). Outbreaks involved a median of 5 states (range: 2-29). Eleven outbreaks were caused by Salmonella; the serotypes were Baildon, Braenderup, Enteritidis, Javiana, Minnesota, Newport, Paratyphi B variant L(+) tartrate(+), Saintpaul, Stanley, Typhimurium, and multiple serotypes (1 outbreak each). Ten multistate outbreaks were caused by STEC (serogroups O157 [6 outbreaks], O103 [1], O111 [1], O121 [1], and O145 [1]). Three were caused by Listeria and one by norovirus. The foods implicated in Salmonella outbreaks were almond and peanut butter, cantaloupe (suspected), cashews (suspected), chia seed powder, cucumber, grapes (suspected), ground beef (suspected), mango (suspected), mini cucumbers (suspected), mini peppers (suspected),

and mung bean sprouts (1 each). For STEC, implicated foods included ground beef in 4 outbreaks (1 confirmed, 3 suspected) (serogroups O157 [3 outbreaks] and O145 [1]); cabbage (serogroup O111), clover sprouts (O121), leaf lettuce (O157), pre-packaged salad (O157), spinach (suspected) (O157), and an undetermined food from a Mexicanstyle chain restaurant (O103). Foods implicated in the *Listeria* multistate outbreaks were apples, stone fruit, and mung bean sprouts (1 outbreak each). Raw oysters were implicated in the norovirus outbreak.

# Multistate Outbreaks Spanning Multiple Years

Five multistate outbreaks investigated in 2014 are not included in the 2014 tally because the first outbreak-associated illness occurred before 2014. Two were caused by *Listeria*; the implicated foods were ice cream (first illness in 2010) and Latinstyle soft cheese (first illness in 2013). Two were caused by *Salmonella*; the implicated foods were chicken (first illness in 2013) and tilapia (first illness in 2013). One outbreak was caused by niacin in infused-rice products (first illness in 2013).

### **Limitations**

The findings in this report have at least three limitations. First, only a small proportion of foodborne illnesses that occur each year are identified as being associated with outbreaks. The extent to which the distribution of food vehicles and locations of preparation implicated in outbreaks reflect the same vehicles and locations as sporadic foodborne illnesses is unknown. Similarly, not all outbreaks are identified, investigated, or reported. Second, many outbreaks had an unknown etiology, an unknown food vehicle, or both, and conclusions drawn from outbreaks with a confirmed etiology or food vehicle might not apply to other outbreaks. Finally, CDC's outbreak surveillance system is dynamic. Agencies can submit new reports and change or delete reports as information becomes available. Therefore, the results of this analysis might differ from those in other reports.

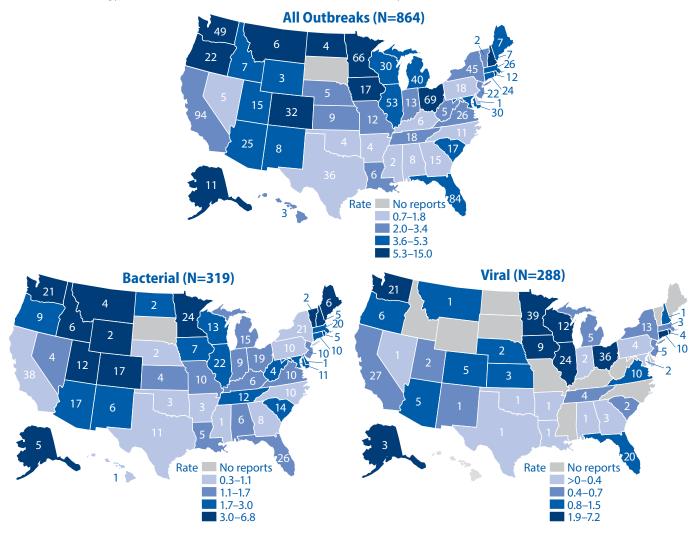
#### **Additional Information**

Public health, regulatory, and food industry professionals can use this information to target prevention efforts against pathogens and foods that cause the most foodborne disease outbreaks. Learn more about how outbreaks are reported and tracked at <a href="http://www.cdc.gov/foodsafety/fdoss/">http://www.cdc.gov/foodsafety/fdoss/</a>.

#### References

- 1. Scallan E, Hoekstra RM, Angulo FJ, et al. Foodborne illness acquired in the United States—major pathogens. Emerging Infectious Diseases 2011; 17(1): 7–15.
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- 3. Interagency Food Safety Analytics Collaboration (IFSAC): Completed Projects. Available at: <a href="http://www.cdc.gov/foodsafety/ifsac/projects/completed.html">http://www.cdc.gov/foodsafety/ifsac/projects/completed.html</a>. Accessed October 15, 2015.

**Figure:** Rate of reported foodborne disease outbreaks per 1 million population\* and number of outbreaks,<sup>†</sup> by state<sup>‡</sup> and etiology<sup>§</sup>— Foodborne Disease Outbreak Surveillance System, United States, 2014.



<sup>\*</sup> Cutpoints for outbreak rate categories determined using quartiles. Legend differs for each map.

<sup>&</sup>lt;sup>†</sup> Reported outbreaks in each state. Puerto Rico reported 4 outbreaks (not shown).

<sup>†</sup> Includes 25 multistate outbreaks (i.e., outbreaks in which exposure occurred in more than one state) assigned as an outbreak to each state involved. Multistate outbreaks involved a median of five states (range: 2–29).

<sup>§</sup> Includes outbreaks caused by both confirmed and suspected etiologies.

**Table 1:** Foodborne disease outbreaks, outbreak-associated illnesses, and hospitalizations, by etiology (confirmed or suspected)\*—Foodborne Disease Outbreak Surveillance System, United States, 2014.

		No. Ou	tbreaks			No. III	nesses		No. Hospitalizations				
Etiology	CE	SE	Total	%	CE	SE	Total	%	CE	SE	Total	%	
Bacterial													
Salmonella <sup>†</sup>	140	9	149	22	2395	168	2563	22	395	5	400	58	
Campylobacter <sup>‡</sup>	24	7	31	5	324	29	353	3	29	1	30	4	
Clostridium perfringens	13	17	30	5	678	552	1230	11	1	0	1	0	
Escherichia coli, Shiga toxin-producing (STEC)§	23	1	24	4	220	2	222	2	62	0	62	9	
Staphylococcus aureus enterotoxin	9	8	17	3	504	62	566	5	9	1	10	1	
Shigella <sup>1</sup>	11	5	16	2	366	23	389	3	26	1	27	4	
Bacillus cereus	4	11	15	2	102	103	205	2	0	1	1	0	
Listeria monocytogenes	9	0	9	1	55	0	55	0	51	0	51	7	
Vibrio parahaemolyticus	8	0	8	1	28	0	28	0	3	0	3	0	
Clostridium botulinum	4	0	4	1	10	0	10	0	9	0	9	1	
Streptococcus, Group A	1	0	1	0	54	0	54	0	0	0	0	0	
Escherichia coli, Enteroaggregative	1	0	1	0	4	0	4	0	0	0	0	0	
Other	0	12	12	2	0	179	179	2	0	0	0	0	
Subtotal	247	70	317	48	4740	1118	5858	51	585	9	594	85	
Chemical and toxin													
Ciguatoxin	18	1	19	3	69	3	72	1	11	0	11	2	
Scombroid toxin/Histamine	17	0	17	3	40	0	40	0	0	0	0	0	
Mycotoxins	4	0	4	1	9	0	9	0	4	0	4	1	
Puffer fish tetrodotoxin	1	0	1	0	2	0	2	0	0	0	0	0	
Other	6	5	11	2	25	23	48	0	11	0	11	2	
Subtotal	46	6	52	8	145	26	171	1	26	0	26	4	
Parasitic													
Cryptosporidium	3	1	4	1	18	6	24	0	1	1	2	0	
Trichinella	2	0	2	0	6	0	6	0	1	0	1	0	
Cyclospora	2	0	2	0	16	0	16	0	1	0	1	0	
Subtotal	7	1	8	1	40	6	46	0	3	1	4	1	
Viral													
Norovirus	157	127	284	43	3835	1505	5340	47	44	20	64	9	
Hepatitis A	2	0	2	0	15	0	15	0	7	0	7	1	
Sapovirus	2	0	2	0	35	0	35	0	0	0	0	0	
Subtotal	161	127	288	43	3885	1505	5390	47	51	20	71	10	
Single etiology**	461	204	665	77	8810	2655	11465	87	665	30	695	98	
Multiple etiologies	5	7	12	1	268	211	479	4	11	0	11	2	
Unknown etiology <sup>††</sup>	0	187	187	22	1302	1302	1302	10	0	6	6	1	
Total	466	398	864	100	9078	4168	13246	100	676	36	712	100	

 $\textbf{Abbreviations:} \ \mathsf{CE} = \mathsf{confirmed} \ \mathsf{etiology}; \ \mathsf{SE} = \mathsf{suspected} \ \mathsf{etiology}.$ 

<sup>\*</sup> If at least one etiology was laboratory-confirmed, the outbreak was considered to have a confirmed etiology. If no etiology was laboratory-confirmed, but an etiology was reported based on clinical or epidemiologic features, the outbreak was considered to have a suspected etiology.

<sup>†</sup> Salmonella causing more than five outbreaks were Enteritidis (40 outbreaks), Typhimurium (15), Javiana (6), I 4,[5], 12:i:- (6), and Newport (6).

<sup>†</sup> Campylobacter jejuni (19 outbreaks), Campylobacter unknown species (10), and Campylobacter coli (1), and Campylobacter multiple species (1).

<sup>§</sup> STEC serogroups O157 (12 outbreaks), O26 (3), O111 (3), O121 (2), O186 (1), O103 (1), O145 (1), and unknown serogroup (1).

Shigella sonnei (12 outbreaks), Shigella flexneri (2), and Shigella unknown species (2).

<sup>\*\*</sup>The denominator for the etiology percentages is the single etiology total. The denominatory for the single etiology, multiple etiologies, and unknown etiology is the total. Because of rounding, numbers might not add up to the single etiology total or the total.

<sup>&</sup>lt;sup>††</sup> An etiologic agent was not confirmed or suspected based on clinical, laboratory, or epidemiologic information.

**Table 2a:** Foodborne disease outbreaks and outbreak-associated illnesses, by food category\*—Foodborne Disease Outbreak Surveillance System, United States, 2014.

	No. Ou	tbreaks	No. IIIı	nesses
Food Category*	Total	%	Total	%
Aquatic animals				
Crustaceans	4	2	29	1
Mollusks <sup>†</sup>	16	8	103	4
Fish	43	21	203	7
Other aquatic animals	1	0	3	0
Subtotal	64	31	338	12
and animals		'		
Dairy <sup>‡</sup>	19	9	267	10
Eggs	4	2	28	1
Beef	15	7	152	6
Pork	9	4	134	5
Other meat (sheep, goat, etc.)	1	0	3	0
Chicken	23	11	354	13
Turkey	6	3	235	9
Other poultry	1	0	3	0
Game	2	1	6	0
Subtotal	80	39	1182	43
Plants				
Oils and sugars	1	0	2	0
Fungi	5	2	11	0
Sprouts	4	2	141	5
Root and other underground vegetables§	2	1	31	1
Seeded vegetables <sup>1</sup>	7	3	428	16
Herbs	1	0	7	0
Vegetable row crops**	13	6	174	6
Fruits <sup>††</sup>	10	5	139	5
Grains and beans#	9	4	104	4
Nuts and seeds <sup>§§</sup>	3	1	55	2
Subtotal	55	27	1092	40
Other	6	3	115	4
Food reported, attributed to a single food category <sup>11</sup>	205	24	2727	21
Food reported, not attributed to a single food category	164	19	3517	27
No food reported	495	57	7002	53
Total <sup>99</sup>	864	100	13246	100

<sup>\*</sup> Interagency Food Safety Analytics Collaboration (IFSAC) food categorization scheme: http://www.cdc.gov/foodsafety/ifsac/projects/completed.html.

<sup>&</sup>lt;sup>†</sup> All were bivalve mollusks.

<sup>&</sup>lt;sup>†</sup> Unpasteurized dairy products (15 outbreaks), pasteurized dairy products (3), and unknown if product pasteurized (1).

<sup>§</sup> Bulbs (1 outbreak) and tubers (1).

<sup>&</sup>lt;sup>1</sup> Vine-grown seeded vegetables (4 outbreaks), solanaceous seeded vegetables (2), and legumes (1).

<sup>\*\*</sup> Leafy vegetables (12 outbreaks), stem vegetables (1).

<sup>&</sup>lt;sup>††</sup> Fruits not further classified (2 outbreaks), pome fruits (2), small fruits (2), melons (1), stone fruits (1), sub-tropical fruits (1), and tropical fruits (1).

<sup>&</sup>lt;sup>#</sup> Grains (5 outbreaks), beans (3), and grains and beans not further classified (1).

<sup>§§</sup> Nuts (2 outbreaks) and seeds (1).

<sup>11</sup> The denominator for the food category percentages is the "food reported, attributed to a single food category" total. The denominator for the "food reported attributed to a single food category", and "No food reported" is the total. Because of rounding, numbers might not add up to the "food reported, attributed to a single food category" total or the total.

**Table 2b:** Most common confirmed pathogen-food category pairs resulting in outbreaks, outbreak-associated illnesses, hospitalizations, and deaths—Foodborne Disease Outbreak Surveillance System, United States, 2014.

Top 5 pathogen-food category pairs resulting in outbreaks														
Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths									
Ciguatoxin	Fish	19	72	11	0									
Scombroid toxin/Histamine	Fish	16	38	0	0									
Salmonella	Chicken	11	227	23	0									
Campylobacter	Dairy	8	144	12	1									
Vibrio parahaemolyticus	Mollusks	8	28	3	0									

Top 5 pathogen-food category pairs resulting in outbreak-associated illnesses														
Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths									
Salmonella	Seeded vegetables	5	357	68	1									
Salmonella	Chicken	11	227	23	0									
Staphylococcus aureus enterotoxin	Turkey	2	184	8	0									
Campylobacter	Dairy	8	144	12	1									
Salmonella	Sprouts	1	115	19	0									

Top 5 pathogen-food category pairs resulting in outbreak-associated hospitalizations													
Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths								
Salmonella	Seeded vegetables	5	357	68	1								
Listeria monocytogenes	Fruits	2	37	36	8								
Salmonella	Chicken	11	227	23	0								
Salmonella	Sprouts	1	115	19	0								
Escherichia coli, Shiga toxin-producing	Vegetable row crops	6	105	18	0								

Pathogen-food category pairs resulting	athogen-food category pairs resulting in outbreak-associated deaths														
Etiology	Food Category*	No. Outbreaks	No. Illnesses	No. Hospitalizations	No. Deaths										
Listeria monocytogenes	Fruits	2	37	36	8										
Norovirus	Chicken	2	34	0	2										
Listeria monocytogenes	Sprouts	2	7	5	2										
Campylobacter	Dairy	8	144	12	1										
Salmonella	Seeded vegetables	5	357	68	1										
Escherichia coli, Shiga toxin-producing	Beef	5	40	16	1										
Listeria monocytogenes	Dairy	1	3	2	1										
Clostridium botulinum	Fish	1	3	2	1										

 $<sup>*</sup> Interagency Food Safety Analytics Collaboration (IFSAC) food categorization scheme: \\ \underline{http://www.cdc.gov/foodsafety/ifsac/projects/completed.html}.$ 

**Table 3a:** Reported foodborne disease outbreaks and outbreak-associated illnesses, by location of food preparation—Foodborne Disease Outbreak Surveillance System, United States, 2014.

	No. Ou	tbreaks	No. III	nesses
Location of food preparation	Total	%	Total	%
Restaurant	485	65	4780	44
Sit-down dining	394	53	3916	36
Fast-food	59	8	521	5
Other or unknown type	25	3	258	2
Multiple types	7	1	85	1
Catering or banquet facility	92	12	3192	29
Private home	86	12	778	7
Institutional location	26	4	1404	13
School	9	1	359	3
Prison or jail	9	1	650	6
Camp	4	1	86	1
Day Care	1	0	23	0
Indoor workplace	1	0	269	2
Other	2	0	17	0
Other location	8	1	114	1
Other commercial location	29	4	402	4
Grocery store	13	2	146	1
Fair, festival, or temporary mobile service	3	0	35	0
Farm or dairy	10	1	187	2
Other	<u>3</u>	<u>0</u>	<u>34</u>	<u>0</u>
Hospital or nursing home	11	1	168	2
Nursing home	9	1	151	1
Hospital	2	0	17	0
Other private location	16	2	374	3
Place of worship	3	0	40	0
Other	2	0	17	0
Single location*	742	86	10895	82
Multiple locations	58	7	1543	12
Unknown location	64	7	808	6
Total	864	100	13246	100

<sup>\*</sup>The denominator for the location percentages is the single location total. The denominator for the single location, multiple locations, and unknown location is the total. Because of rounding, numbers might not add up to the single location total or the total.

**Table 3b:** Foodborne disease outbreaks and outbreak-associated illnesses, by confirmed etiology\* and location of food preparation—Foodborne Disease Outbreak Surveillance System, United States, 2014.

	ban	ring or quet ility	Resta	urant		her nercial tion	nur	ital or sing me		utional ition		vate me	priv	her /ate ntion		her ition
Etiology	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI
Bacterial																
Salmonella	8	339	52	649	5	61	1	15	6	109	27	270	2	36	2	15
Campylobacter	3	87	9	56	5	134	1	19	_‡	-	5	24	-	-	1	4
Clostridium perfringens	5	249	3	50	-	-	-	-	1	167	1	40	-	-	-	-
Escherichia coli, Shiga toxin-producing	1	57	10	96	-	-	-	-	-	-	7	30	1	4	-	-
Staphylococcus aureus enterotoxin	1	141	3	17	-	-	-	-	2	252	-	-	-	-	1	43
Shigella	-	-	7	55	_	-	_	-	2	292	1	11	-	-	_	-
Bacillus cereus	1	4	2	67	-	-	_	-	-	-	-	-	-	-	-	-
Listeria monocytogenes	-	_	2	7	1	2	2	4	_	-	1	2	-	_	1	35
Vibrio parahaemolyticus	-	-	5	18	_	-	_	-	_	-	-	-	-	-	-	-
Clostridium botulinum	-	-	_	_	_	-	_	-	_	-	2	5	1	3	_	-
Streptococcus, Group A	-	-	_	-	-	-	-	_	1	54	-	-	-	-	-	-
Escherichia coli, Enteroaggregative	-	_	_	_	-	_	-	_	1	4	-	_	-	_	_	_
Other	-	-	_	-	-	-	-	_	_	-	-	-	-	-	_	-
Subtotal	19	877	93	1015	11	197	4	38	13	878	44	382	4	43	5	97
Chemical and toxin																
Ciguatoxin	-	_	4	12	-	-	_	-	-	-	12	49	-	-	-	-
Scombroid toxin/Histamine	-	_	13	28	1	2	-	_	_	-	1	2	-	_	_	_
Mycotoxins	-	-	_	-	-	-	-	_	_	-	2	5	-	-	_	-
Puffer fish tetrodotoxin	-	_	_	_	-	_	-	_	_	-	1	2	-	_	_	=
Other	-	-	3	9	-	-	-	_	_	-	-	-	-	-	1	10
Subtotal	-	_	20	49	1	2	-	-	_	-	16	58	-	-	1	10
Parasitic																
Cryptosporidium	-	-	-	-	2	10	-	-	-	-	1	8	-	-	-	-
Trichinella	-	_	_	_	_	-	-	-	1	4	1	2	-	_	_	_
Cyclospora	-	-	1	2	-	-	-	-	_	-	-	-	-	-	_	-
Subtotal	-	_	1	2	2	10	-	_	1	4	2	10	_	-	_	-
Viral																
Norovirus	27	885	90	1938	4	88	3	92	5	251	8	136	-	-	1	3
Hepatitis A	-	-	2	15	_	-	-	-	-	-	-	-	_	-	-	_
Sapovirus	1	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	28	899	92	1953	4	88	3	92	5	251	8	136	-	-	1	3
Single etiology	47	1776	206	3019	19	302	7	130	19	1133	70	586	4	43	7	110
Multiple etiologies	1	216	2	9	_	-	_	-	_	-	1	38	_	-	-	_
Total	48	1992	208	3028	19	302	7	130	19	1133	71	624	4	43	7	110

**Abbreviations:** NO = number of outbreaks; NI = number of illnesses.

<sup>\*</sup> If at least one etiology was laboratory-confirmed, the outbreak was considered to have a confirmed etiology. If no etiology was laboratory-confirmed, but an etiology was reported based on clinical or epidemiologic features; the outbreak was considered to have a suspected etiology.

<sup>†</sup> Reported locations were grouped as follows: catering or banquet facility, restaurant, other commorcial location, hospital or nursing home, other institutional location, private home, other private location, and other location (see Table 3a).

<sup>\*</sup> No outbreaks in the data reported fall into this category.

<sup>§</sup> An etiologic agent was not confirmed or suspected based on clinical, laboratory, or epidemiologic information.

**Table 3c:** Foodborne disease outbreaks and outbreak-associated illnesses, by suspected etiology\* and location of food preparation—Foodborne Disease Outbreak Surveillance System, United States, 2014.

	ban	ring or quet ility	Resta	urant		ner iercial tion	Hospi nurs ho	sing		itional tion		vate me	priv	her /ate ation	Oth loca	
Etiology	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI	NO	NI
Bacterial																
Salmonella	_‡	-	7	57	-	-	-	-	2	111	-	-	-	-	-	-
Campylobacter	-	-	2	8	1	2	-	-	_	-	3	11	_	-	-	-
Clostridium perfringens	4	460	11	55	1	25	-	-	-	-	1	12	-	-	-	-
Escherichia coli, Shiga toxin-producing	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-
Staphylococcus aureus enterotoxin	1	20	6	34	-	-	-	-	_	-	-	-	-	-	-	-
Shigella	2	4	2	17	_	-	-	-	1	2	-	-	_	-	-	-
Bacillus cereus	2	34	6	33	-	-	-	-	_	-	-	-	-	-	-	-
Listeria monocytogenes	-	_	-	-	_	-	-	-	_	-	-	-	_	-	-	-
Vibrio parahaemolyticus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clostridium botulinum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptococcus, Group A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Escherichia coli, Enteroaggregative	-	-	-	-	_	-	-	-	_	-	-	-	_	-	-	-
Other	1	12	8	118	1	32	2	17	-	-	-	-	-	-	-	-
Subtotal	10	530	42	322	4	61	2	17	3	113	4	23	-	-	-	-
Chemical and toxin																
Ciguatoxin	-	-	-	-	-	_	-	-	_	-	1	3	-	-	-	-
Scombroid toxin/Histamine	_	-	-	-	_	-	-	-	_	-	-	_	_	-	-	-
Mycotoxins	-	-	-	-	-	_	-	-	_	-	-	-	-	-	_	-
Puffer fish tetrodotoxin	-	_	-	-	-	_	_	-	_	_	-	_	_	-	_	-
Other	1	3	3	12	1	8	-	-	_	-	-	-	-	-	-	-
Subtotal	1	3	3	12	1	8	_	-	-	-	1	3	-	-	-	-
Parasitic																
Cryptosporidium	_	-	-	-	-	-	-	-	_	-	1	6	_	-	-	-
Trichinella	-	-	-	_	_	-	-	-	-	-	-	-	_	-	-	-
Cyclospora	-	-	-	-	-	_	-	-	_	-	-	-	-	-	_	-
Subtotal	-	-	-	-	_	-	-	-	_	-	1	6	_	-	-	-
Viral																
Norovirus	24	550	85	607	1	5	-	-	3	153	3	29	1	14	-	-
Hepatitis A	-	-	-	-	_	-	-	-	-	-	-	-	-	-	-	-
Sapovirus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	24	550	85	607	1	5	_	-	3	153	3	29	1	14	-	-
Single etiology	35	1083	133	953	6	74	2	17	6	266	9	61	1	14	-	-
Multiple etiologies	_	_	2	9	-	-	1	6	-	-	-	-	_	-	-	-
Unknown etiology <sup>§</sup>	9	117	142	790	4	26	1	15	1	5	6	93	_	-	1	4
Total	44	1200	277	1752	10	100	4	38	7	271	15	154	1	14	1	4

**Abbreviations:** NO = number of outbreaks; NI = number of illnesses.

<sup>\*</sup> If at least one etiology was laboratory-confirmed, the outbreak was considered to have a confirmed etiology. If no etiology was laboratory-confirmed, but an etiology was reported based on clinical or epidemiologic features; the outbreak was considered to have a suspected etiology.

<sup>†</sup> Reported locations were grouped as follows: catering or banquet facility, restaurant, other commorcial location, hospital or nursing home, other institutional location, private home, other private location, and other location (see Table 3a).

<sup>&</sup>lt;sup>‡</sup> No outbreaks in the data reported fall into this category.

<sup>§</sup> An etiologic agent was not confirmed or suspected based on clinical, laboratory, or epidemiologic information.

Table 4: Multistate foodborne disease outbreaks, United States, 2014.

Implicated food\* Month of first No. No. No. No. states **Etiology** illnesses hospitalizations deaths involved Name Confirmed Recall illness onset Salmonella Braenderup 6 0 Almond and peanut butter Yes Yes **January** 0 2 **January** Shiga toxin-producing E. coli O157:H7 4 0 Ground beef No No Salmonella serotypes Hartford, 31 0 **January** 16 Chia seed powder Yes Yes Oranienburg, and Newport **April** Salmonella serotype Baildon 20 6 0 15 Cantaloupe No No Shiga toxin-producing E. coli O157:H7 4 0 2 April Spinach No No Shiga toxin-producing E. coli O157:H7 12 7 0 4 Ground beef Yes April Yes Shiga toxin-producing E. coli O121 19 0 6 Clover sprouts Yes No May 48 May Salmonella serotype Newport 275 1 29 Cucumber Yes No Shiga toxin-producing E. coli O145 May 8 3 0 5 Ground beef No No 12 4 0 5 Ground beef May Shiga toxin-producing E. coli O157:H7 No No May Salmonella serotype Minnesota 4 0 4 Mango No No June Shiga toxin-producing E. coli O157:H7 16 13 0 6 Pre-packaged salad Yes No Shiga toxin-producing E. coli O111 June 16 Cabbage Yes No Listeria monocytogenes 2 2 1 2 Stone fruit June Yes Yes 5 2 Mung bean sprouts June Listeria monocytogenes 3 Yes Yes June Salmonella serotype Paratyphi B 21 5 0 10 Mini peppers No No July Salmonella serotype Typhimurium 47 11 0 19 Ground beef No No **August** Salmonella serotype Saintpaul 27 10 0 7 Grapes No No September Salmonella serotype Enteritidis 115 19 0 12 Mung bean sprouts Yes No October 8 0 17 Mini cucumbers Salmonella serotype Javiana 36 No No No food reported October Shiga toxin-producing E. coli O103:H2 12 0 0 5 No October Listeria monocytogenes 35 34 7 12 Apple Yes Yes November Norovirus genogroup II, genotype 2 22 0 0 2 Raw oysters Yes Yes November Shiga toxin-producing E. coli O157:H7 11 2 0 2 Leaf lettuce Yes Yes 0 December Salmonella serotype Stanley 18 6 Cashews No No

<sup>\*</sup>Implicated foods in multistate outbreaks were further classified as confirmed or suspected based on epidemiologic, traceback, and laboratory evidence. A food was considered confirmed if the investigation yielded all three types of evidence or if strong evidence was available from two types of evidence. If fewer than two types of evidence were available or the evidence from two types was not sufficiently strong then the implicated food was considered suspected.

**Appendix:** Foodborne disease outbreaks by confirmed etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

	Contamination Factors							No. outbreaks with reported	Total No.									
Etiology	<b>C</b> 1	C2	<b>C</b> 3	C4	<b>C</b> 5	C6	<b>C7</b>	<b>C8</b>	C9	C10	C11	<b>C</b> 12	C13	C14	C15	≥1 factor reported	contributing factors	outbreak
Bacterial																		
Salmonella	_‡	-	-	-	-	14	9	-	20	4	2	2	3	5	8	46	52	140
Campylobacter	-	-	-	-	-	8	4	-	3	-	-	-	-	-	1	15	15	24
Clostridium perfringens	-	-	-	-	-	1	-	-	-	-	-	1	1	1	1	4	9	13
Escherichia coli, Shiga toxin-producing	-	-	-	-	-	2	3	-	-	-	-	-	-	-	-	5	5	23
Staphylococcus aureus enterotoxin	-	-	-	-	-	-	-	-	-	1	2	2	-	1	2	6	6	9
Shigella	-	-	-	-	-	-	-	-	-	3	2	2	-	-	-	5	5	11
Bacillus cereus	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	2	4	4
Listeria monocytogenes	-	-	-	-	-	-	3	3	-	-	-	-	-	2	-	6	6	9
Vibrio parahaemolyticus	-	-	-	-	-	-	8	1	_	-	-	_	-	-	_	8	8	8
Clostridium botulinum	2	-	-	-	-	-	1	-	-	-	-	_	-	1	1	4	4	4
Streptococcus, Group A	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	1	1
Escherichia coli, Enteroaggregative	-	-	-	-	_	-	1	_	-	_	-	-	_	-	-	1	1	1
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	2	-	-	-	-	25	29	4	24	9	7	7	4	10	13	103	116	247
Chemical and toxin																		
Ciguatoxin	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	17	18
Scombroid toxin/Histamine	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	13	17
Mycotoxins	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	4	4
Puffer fish tetrodotoxin	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
Other	1	-	2	2	-	-	-	-	-	-	-	-	-	-	-	4	4	6
Subtotal	35	-	2	2	-	-	-	-	-	-	-	_	-	-	_	38	39	46
Parasitic																		
Cryptosporidium	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2	2	3
Trichinella	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
Cyclospora	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	1	2
Subtotal	2	-	-	-	-	-	3	-	-	-	-	_	-	-	-	5	5	7
Viral																		
Norovirus	-	-	-	-	-	1	6	1	3	45	22	25	7	2	4	86	86	157
Hepatitis A	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1	2
Sapovirus	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2	2	2
Subtotal		_	_	_	_	1	6	1	3	46	24	25	7	2	4	89	89	161
Single etiology	39	-	2	2	-	26	38	5	27	55	31	32	11	12	17	235	249	461
Multiple etiologies	-	-	-	-	-	1	1	-	-	-	-	-	-	-	_	2	3	5
Total	39	_	2	2	_	27	39	5	27	55	31	32	11	12	17	237	252	466

**Appendix:** Foodborne disease outbreaks by confirmed etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

	Proliferation/Amplification Factors <sup>‡</sup>											No. outbreaks with reported	Total No.		
Etiology	P1	P2	Р3	P4	P5	P6	P7	P8	Р9	P10	P11	P12	≥1 factor reported	contributing factors	outbreaks
Bacterial															
Salmonella	18	13	1	3	12	1	10	7	_§	-	1	5	35	52	140
Campylobacter	1	1	-	-	-	-	-	-	-	-	1	1	4	15	24
Clostridium perfringens	4	4	-	1	3	1	3	3	-	-	-	2	9	9	13
Escherichia coli, Shiga toxin-producing	1	-	-	-	-	-	-	-	-	-	-	1	2	5	23
Staphylococcus aureus enterotoxin	2	2	-	-	2	-	1	2	-	-	-	1	6	6	9
Shigella	-	-	-	1	1	-	-	-	-	-	-	1	3	5	11
Bacillus cereus	2	1	-	-	-	-	1	-	-	-	-	1	4	4	4
Listeria monocytogenes	-	-	-	-	-	-	-	-	-	-	-	2	2	6	9
Vibrio parahaemolyticus	-	-	-	-	-	-	-	-	-	-	-	-	-	8	8
Clostridium botulinum	2	1	-	-	-	-	-	-	-	-	1	-	4	4	4
Streptococcus, Group A	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Escherichia coli, Enteroaggregative	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Subtotal	30	22	1	5	18	2	15	12	-	-	3	14	69	116	247
Chemical and toxin															
Ciguatoxin	-	-	-	-	-	-	-	-	-	-	-	-	-	17	18
Scombroid toxin/Histamine	-	-	-	3	2	-	-	-	-	-	-	1	6	13	17
Mycotoxins	-	-	-	-	-	-	-	-	-	-	-	-	-	4	4
Puffer fish tetrodotoxin	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	4	6
Subtotal	-	-	-	3	2	-	-	-	-	-	-	1	6	39	46
Parasitic															
Cryptosporidium	-	-	-	-	-	-	-	-	-	-	-	1	1	2	3
Trichinella	-	-	-	-	-	-	-	-	-	-	-	-	=	2	2
Cyclospora	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2
Subtotal	-	-	-	-	-	-	-	-	_	-	-	1	1	5	7
Viral															
Norovirus	4	1	-	1	-	-	-	-	-	-	-	1	5	86	157
Hepatitis A	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2
Sapovirus	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
Subtotal	4	1	-	1	-	_	_	_	_	_	_	1	5	89	161
Single etiology	34	23	1	9	20	2	15	12	-	-	3	17	81	249	461
Multiple etiologies	-	-	-	-	-	_	1	_	-	-	-	_	1	3	5
Total	34	23	1	9	20	2	16	12	-	-	3	17	82	252	466

**Appendix:** Foodborne disease outbreaks by confirmed etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

			Surviv	No. outbreaks with reported	Total No.				
tiology	<b>S</b> 1	<b>S2</b>	<b>S</b> 3	<b>S4</b>	<b>S</b> 5	≥1 factor reported	contributing factors	outbreaks	
acterial									
Salmonella	18	7	1	2	6	26	52	140	
Campylobacter	6	_9	-	-	1	7	15	24	
Clostridium perfringens	2	2	-	-	1	4	9	13	
Escherichia coli, Shiga toxin-producing	2	-	-	-	1	3	5	23	
Staphylococcus aureus enterotoxin	1	1	-	-	1	2	6	9	
Shigella	-	-	-	-	-	-	5	11	
Bacillus cereus	2	1	-	-	1	3	4	4	
Listeria monocytogenes	-	_	-	1	2	2	6	9	
Vibrio parahaemolyticus	-	-	-	-	-	-	8	8	
Clostridium botulinum	-	-	-	-	3	3	4	4	
Streptococcus, Group A	-	-	-	-	-	-	1	1	
Escherichia coli, Enteroaggregative	_	-	-	-	-	-	1	1	
Other	-	-	-	-	-	-	-	-	
Subtotal	31	11	1	3	16	50	116	247	
nemical and toxin									
Ciguatoxin	-	-	-	-	-	-	17	18	
Scombroid toxin/Histamine	-	-	-	-	-	-	13	17	
Mycotoxins	-	-	-	-	-	-	4	4	
Puffer fish tetrodotoxin	_	-	-	-	-	-	1	1	
Other	-	-	-	-	-	-	4	6	
Subtotal	-	-	-	-	-	-	39	46	
arasitic									
Cryptosporidium	-	-	-	-	-	-	2	3	
Trichinella	2	-	-	-	-	2	2	2	
Cyclospora	-	-	-	-	-	-	1	2	
Subtotal	2	-	-	-	-	2	5	7	
iral									
Norovirus	2	-	1	-	4	7	86	157	
Hepatitis A	-	-	-	-	-	-	1	2	
Sapovirus	-	-	-	-	-	-	2	2	
Subtotal	2	-	1	_	4	7	89	161	
ingle etiology	35	11	2	3	20	59	249	461	
lultiple etiologies	_	_	_	_	_	=	3	5	
otal	35	11		3	20	59	252	466	

**Appendix:** Foodborne disease outbreaks by suspected etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

							Cor	ntam	inat	ion l	Facto	ors					No. outbreaks with reported	Total No.
Etiology		C2	<b>C</b> 3	C4	C5	<b>C</b> 6	<b>C7</b>	<b>C</b> 8	C9	C10	0 C11 C1		:12 C13 C1		C15	≥1 factor reported	contributing factors	outbreaks
Bacterial																		
Salmonella	_§	-	-	-	-	-	-	-	2	-	-	2	-	-	1	4	4	9
Campylobacter	-	-	-	-	-	1	2	-	2	-	-	-	-	1	1	5	5	7
Clostridium perfringens	2	-	-	-	-	2	-	-	-	-	-	_	-	-	_	4	12	17
Escherichia coli, Shiga toxin-producing	-	-	-	-	-	-	-	-	1	-	-	_	-	-	-	1	1	1
Staphylococcus aureus enterotoxin	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	2	5	8
Shigella	-	-	-	-	-	_	-	_	-	-	-	_	-	-	1	1	3	5
Bacillus cereus	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1	2	7	11
Listeria monocytogenes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vibrio parahaemolyticus	-	-	-	-	-	-	-	-	-	-	-	_	-	-	-	-	-	-
Clostridium botulinum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	_	-
Streptococcus, Group A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Escherichia coli, Enteroaggregative	-	-	-	-	-	_	-	_	-	-	-	-	-	-	-	-	-	-
Other	-	_	-	-	_	_	1	_	2	-	-	_	-	-	5	6	9	12
Subtotal	2	_	_	-	_	3	3	-	7	2	-	2	_	2	10	25	46	70
Chemical and toxin																		
Ciguatoxin	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
Scombroid toxin/Histamine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mycotoxins	-	_	_	-	_	_	-	_	-	-	-	_	_	-	_	-	-	-
Puffer fish tetrodotoxin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2	3	5
Subtotal	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	3	4	6
Parasitic																		
Cryptosporidium	-	-	-	-	-	-	_	-	_	-	-	-	-	-	-	-	-	1
Trichinella	_	_	-	-	_	_	-	_	-	_	_	_	-	-	_	-	_	-
Cyclospora	_	_	-	_	_	-	-	-	-	-	-	_	-	-	_	-	_	-
Subtotal	_	_	-	-	-	-	-	-	-	-	-	_	_	-	_	-	-	1
Viral																		
Norovirus	_	_	-	_	_	_	3	_	1	21	15	10	5	3	11	45	46	127
Hepatitis A	-	_	-	_	_	_	-	_	-	-	-	_	-	-	_	-	-	-
Sapovirus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	-	-	-	-	-	-	3	-	1	21	15	10	5	3	11	45	46	127
Single etiology	3	-	2	-	-	3	6	-	8	23	15	12	5	5	21	73	96	204
Multiple etiologies	-	_	_	-	-	1	-	-	-	-	-	_	_	-	_	1	1	7
Unknown etiology	3	-	_	1	-	2	1	-	11	5	6	6	2	7	12	38	59	187
Total	6	_	,	1	_	6	7	_	19	28	21	18	7	12	33	112	156	398

**Appendix:** Foodborne disease outbreaks by suspected etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

				P	rolife	ration	n/Am	plifica	tion	Factor	'S <sup>‡</sup>		No. outbreaks with reported		Total No.
Etiology	P1	P2	Р3	P4	P5	P6	P7	P8	P9	P10	P11	P12	≥1 factor reported	contributing factors	outbreak
acterial															
Salmonella	1	_9	1	-	1	-	-	-	-	-	-	1	1	4	9
Campylobacter	3	1	-	-	1	-	1	-	-	-	-	-	3	5	7
Clostridium perfringens	2	1	-	-	5	1	5	6	-	-	-	2	12	12	17
Escherichia coli, Shiga toxin-producing	-	1	-	1	-	-	-	-	-	-	-	-	1	1	1
Staphylococcus aureus enterotoxin	3	-	-	3	-	-	-	2	-	-	-	-	5	5	8
Shigella	1	-	-	3	1	_	1	1	-	-	-	-	3	3	5
Bacillus cereus	2	4	1	1	2	1	1	2	-	-	-	-	7	7	11
Listeria monocytogenes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vibrio parahaemolyticus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clostridium botulinum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptococcus, Group A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Escherichia coli, Enteroaggregative	-	-	-	-	-	-	-	-	_	-	-	-	-	-	-
Other	2	2	_	_	5	_	3	3	_	_	-	1	8	9	12
Subtotal	14	9	2	8	15	2	11	14	-	_	_	4	40	46	70
Chemical and toxin															
Ciguatoxin	-	-	-	-	-	-	-	-	_	-	-	-	-	1	1
Scombroid toxin/Histamine	-	-	_	-	-	_	_	-	-	_	_	-	-	-	-
Mycotoxins	_	_	_	_	_	_	-	-	_	_	_	-	-	-	-
Puffer fish tetrodotoxin	-	-	_	-	_	_	_	-	-	_	_	-	-	-	-
Other	1	_	_	_	1	_	-	_	_	_	-	1	2	3	5
Subtotal	1	-	-	-	1	-	-	-	_	-	-	1	2	4	6
Parasitic															
Cryptosporidium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Trichinella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclospora	-	-	-	-	-	-	-	-	_	-	-	-	-	-	-
Subtotal	-	-	-	_	-	-	-	-	_	-	-	-	-	-	1
/iral															
Norovirus	-	1	_	_	-	-	1	-	_	_	-	-	2	46	127
Hepatitis A	-	_	_	_	_	_	_	_	_	_	_	-	-	-	-
Sapovirus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	_	1	_	_	-	_	1	-	_	-	_	_	2	46	127
Single etiology	15	10	2	8	16	2	12	14	_	-	-	5	44	96	204
Multiple etiologies	1	-	_	-	_	_	_	1	_	_	_	1	1	1	7
Unknown etiology	7	7	3	10	15	1	15	10	2	_	_	1	42	59	187
Total	23	17	5	18		3	27			_	_	7	87	156	398

**Appendix:** Foodborne disease outbreaks by suspected etiology\* and contributing factors—Foodborne Disease Outbreak Surveillance System, United States, 2014.

			Survi	No. outbreaks with reported	Total No.				
Etiology	<b>S1</b>	<b>S2</b>	<b>S</b> 3	<b>S4</b>	<b>S</b> 5	≥1 factor reported	contributing factors	outbreaks	
Bacterial Bacterial			'						
Salmonella	_§	-	-	-	-	-	4	9	
Campylobacter	1	-	-	_	-	1	5	7	
Clostridium perfringens	2	5	-	-	1	7	12	17	
Escherichia coli, Shiga toxin-producing	_	-	-	_	-	-	1	1	
Staphylococcus aureus enterotoxin	1	-	-	-	-	1	5	8	
Shigella	-	-	-	1	-	1	3	5	
Bacillus cereus	-	-	-	-	-	-	7	11	
Listeria monocytogenes	-	-	-	_	-	-	-	-	
Vibrio parahaemolyticus	-	-	-	-	-	=	-	-	
Clostridium botulinum	-	-	-	-	-	-	-	-	
Streptococcus, Group A	_	-	-	-	-	-	-	-	
Escherichia coli, Enteroaggregative	-	-	-	-	-	-	-	-	
Other	-	-	-	-	4	4	9	12	
Subtotal	4	5	-	1	5	14	46	70	
hemical and toxin			'						
Ciguatoxin	-	-	-	-	-	-	1	1	
Scombroid toxin/Histamine	-	-	-	-	-	-	-	-	
Mycotoxins	-	-	-	-	-	-	-	-	
Puffer fish tetrodotoxin	-	-	-	_	-	-	-	-	
Other	-	-	-	-	-	-	3	5	
Subtotal	_	_	-	_	-	-	4	6	
Parasitic			1						
Cryptosporidium	-	-	-	-	_	-	-	1	
Trichinella	-	-	-	-	_	-	-	-	
Cyclospora	-	-	-	-	-	-	-	-	
Subtotal	-	-	_	-	_	-	-	1	
/iral									
Norovirus	-	-	-	-	1	1	46	127	
Hepatitis A	-	-	_	_	_	-	-	-	
Sapovirus	-	-	-	-	-	=	-	=	
Subtotal	-	-	_	_	1	1	46	127	
Single etiology	4	5	_	1	6	15	96	204	
Multiple etiologies	_	-	_	-	_	_	1	7	
Jnknown etiology	8	5	5	4	3	19	59	187	
Total	12	10	5	5	9	34	156	398	

## **Appendix:** Reported foodborne disease outbreaks, by confirmed etiology and suspected etiology\* and contributing factors†—Foodborne Disease Outbreak Surveillance System, United States, 2014

\* If at least one etiology was laboratory-confirmed, the outbreak was considered to have a confirmed etiology. If no etiology was laboratory-confirmed but an etiology was reported based on clinical or epidemiologic features, the outbreak was considered to have a suspected etiology.

<sup>†</sup>Contributing factors are defined as risk factors that either enable an outbreak to occur or amplify an outbreak caused by other means. Contributing factors are classified into three categories: contamination factors (factors that introduce or otherwise permit contamination), proliferation/amplification factors (factors that allow proliferation or growth of the etiologic agent), and survival factors (factors that allow survival or fail to inactivate a contaminant) (Bryan FL, Guzewich JJ, Todd EC. Surveillance of Foodborne Diseases III. Summary and Presentation of Data on Vehicles and Contributory Factors: Their value and limitations. J Food Prot 1997;60(6):701–14). More than one contributing factor might be reported per outbreak.

<sup>‡</sup>Contributing factors:

C1: toxic substance part of the tissue

C2: poisonous substance intentionally/deliberately added

C3: poisonous substance accidentally/inadvertently added

C4: addition of excessive quantities of ingredients that are toxic in large amounts

C5: toxic container

C6: contaminated raw product—food that was intended to be consumed after a kill step

C7: contaminated raw product—food was intended to be consumed raw or undercooked/underprocessed

C8: foods originating from sources shown to be contaminated or polluted (such as a growing field or harvest area)

C9: cross-contamination of ingredients (cross-contamination does not include ill food workers)

C10: bare-handed contact by a food handler/worker/preparer who is suspected to be infectious

C11: glove-handed contact by a food handler/worker/preparer who is suspected to be infectious

C12: other mode of contamination (excluding cross-contamination) by a food handler/worker/preparer who is suspected to be infectious

C13: foods contaminated by non-food handler/worker/preparer who is suspected to be infectious

C14: storage in a contaminated environment

C15: other source of contamination

P1: food preparation practices that support proliferation of pathogens (during food preparation)

P2: no attempt was made to control the temperature of implicated food or the length of time food was out of temperature control (during food service or display of food)

P3: improper adherence of approved plan to use Time as a Public Health Control

P4: improper cold holding due to malfunctioning refrigeration equipment

P5: improper cold holding due to an improper procedure or protocol

P6: improper hot holding due to malfunctioning equipment

P7: improper hot holding due to improper procedure or protocol

P8: improper/slow cooling

P9: prolonged cold storage

P10: inadequate modified atmospheric packaging

P11: inadequate processing (acidification, water activity, fermentation)

P12: other situations that promoted or allowed microbial growth or toxin production

S1: insufficient time and/or temperature control during initial cooking/heat processing

S2: insufficient time and/or temperature during reheating

S3: insufficient time and/or temperature control during freezing

S4: insufficient or improper use of chemical processes designed for pathogen destruction

S5: other process failures that permit pathogen survival

An etiologic agent was not confirmed or suspected based on clinical, laboratory, or epidemiologic information.

<sup>§</sup> No outbreaks in the data reported fall in this category.

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